

# **PRESS PAD FOR MULTI-DAYLIGHT PRESSES**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

5 The present invention relates to a press pad having a fabric whose warp and/or weft each have alternating types of threads having different elasticities transverse to the thread axis, distinguished in that these types of thread have polymer material with high temperature stability.

### **2. Discussion of the Related Art**

10 Press pads are used in hydraulic heated presses, single or multi-daylight presses, high-pressure presses, or other presses for plastic coating or lamination of derived timber product slabs or for the production of circuit boards, for example. During the pressing procedure, the press pads lie on both sides between the pressure sheets resting on the material to be pressed and the press plates. Through their properties, for comparatively large tolerances, they are to ensure uniform transfer of the pressure over the entire surface for both the components of the  
15 press and the material to be pressed. Convex or concave warping of the press plates through differing heat dissipation or faulty grinding of the material to be pressed may thus be compensated for. For this purpose, the press pad must provide as little resistance as possible to their deformation, but must have the greatest possible elastic recovery in the event of intermittent pressure load.

20 In addition, press pads must be suitable for use at temperatures up to more than 200°C and again allow uniform and, particularly for use in short cycle presses, rapid thermal transfer over the complete surface. Press pads are typically made of a fabric which, depending on the intended purpose, may also have a coating on one or both sides. Such fabrics are known to one skilled in the art in multiple embodiments using both metal and

polymer threads in the thread systems, preferably with warp and weft in linen weave or twill weave and in other types of textures and weaves.

Press pads according to the species have at least two different types of threads, having differing elasticities transverse to the thread axis, in at least one thread system in the fabric.

- 5 In the framework of this publication, both the compressibility transverse to the thread axis and the flexural strength of a thread are included by this concept. Each of these two properties shapes the elasticity of a press pad, which is correspondingly used simultaneously as a term for its compressibility and flexural strength. Such press pads are known, for example, from the brochure "Press Pads for Short Cycle Presses" of Rheinische
- 10 Filztuchfabrik GmbH, Stolberg/Germany under the trade name SINAS<sup>®</sup> UNIVERSAL. The fabric of these press pads has a warp made of an aramid multifilament twisted with copper threads, while the weft is made alternately of bunched copper threads and an elastomer-sheathed textile multifilament. The combination of different threads in one thread system - in the weft in this case - allows the combination of properties of the different threads and the
- 15 tailoring of these properties for specific applications by varying the proportion of one or the other type of thread in an especially simple way. These press pads according to the species are distinguished by outstanding padding effect and a high thermal resistance in combination with very good heat transfer, which may even be increased further by elevating the proportion of copper threads, and are used especially for producing laminated flooring plates
- 20 in modern short cycle multi-daylight presses.

- Higher requirements are placed on the press pad used for the highly wear-resistant melamine coating of high-density fiberboard slabs (also HDF) in single-daylight short cycle presses: microscopically small water vapor bubbles arise in the coating process with the polycondensation of the amino resin, which only diffuse slowly into the high-density
- 25 fiberboard slab. These bubbles may cause a visible gray haze or even porosity in the otherwise transparent coating. This surface flaw, known as "graying", may only be avoided by a pressure on the slab surface which is especially uniform over the entire area. Particularly if the press plates are warped or if the HDF slabs are incorrectly ground, the

differing pressures arising may be uncompensated or compensated insufficiently using known press pads.

## SUMMARY AND OBJECT OF THE INVENTION

### 1. Object

5           The present invention is based on the object of suggesting a press pad, using which the equalization of different pressures is improved in relation to the known press pads.

### 2. Achievement of the Object

10           The recovery of a press pad and/or the padding property results from the type of fabric construction and/or from the pad material used. For pad fabrics having elastomer threads, the elasticity of the elastomers is determined by their Shore hardness, their density, and their permanent set (22 hours at 175°C).

          Investigations have shown that the press pads according to the species have a uniform recovery and/or elasticity over their entire surface.

15           Based on the related art according to the species, the object is achieved according to the present invention in that these types of threads have polymer material with high temperature stability. Investigations have shown that the fabric of the press pad according to the present invention has different Shore hardness and density and significantly improves the compensation of different pressures in comparison to the press pads known according to the species.

20           Alternating according to the present invention is understood to mean both, for example, a sequence of two types of thread A and B as ... A-B-A-B ..., but also ...A-A-B-A-A-B... and, for example, for three types of thread A, B, and C, sequences such as ...A-B-C-A-B-C..., but also ...A-B-C-B-A-B-C-B-A... or other patterns having thread arrangements which repeat regularly in the fabric.

The types of threads preferably each have polymer material in their lateral surfaces. In this way, the compression of the threads transversely to the thread axis is made easier in particular.

5 The polymer material used in the threads is preferably a silicon or fluorosilicone elastomer, a blend of the materials cited above, or another elastomer material with high temperature stability. The Shore hardness of the elastomer may be adjusted to the desired value in the way known to one skilled in the art, through fillers such as quartz powder or metal oxides, for example.

10 The use of bunched or stranded polymer fibers in at least one type of thread is also conceivable. The bunching or stranding particularly allows the use of duroplastic fibers for producing a type of thread having higher elasticity transverse to the thread axis.

15 In an especially preferred embodiment, at least one type of thread in the fabric of the press pad according to the present invention has a polymer sheathing and a core made of a material having a sufficiently large tensile strength for weaving purposes. Through this combination of different materials, the deformability may be adjusted individually longitudinally and transversely to the threads.

20 The core of at least one of the threads is preferably essentially made of metal in order to ensure thermal conduction through the press pad, as well as its good weavability and dimensional stability. In this case, copper, but also brass or stainless steel, depending on the application, are preferably used. Through the sheathing of the threads containing metal in the fabric of a press pad, their pressure on the other threads of the fabric, and therefore their wear, is reduced, even in the contact points.

25 Alternatively or additionally to the sheathing of the threads containing metal, in the same thread system or another thread system, threads whose core is essentially made of polyamide may preferably be used. The use of a pure elastomer thread suggested in WO 96/13376 is hardly advisable from a weaving viewpoint, since loops and warping which project out of the press pad may arise through warping of individual fibers in their lengthwise

direction. Processability and dimensional stability during operation is only ensured with a core of high tensile strength. Through the use of the thinnest possible polyamide core, the Shore hardness and therefore the transverse elasticity of the elastomer thread, which is essential in operation, are hardly influenced in comparison to a metallic core. Aromatic  
5 polyamide fibers are preferably used, such as those marketed by DuPont Inc. under the trade names KEVLAR® and NOMEX®, for example. In principle however, any other type of fiber with high temperature stability which has sufficient tensile strength, such as the melamine resin fiber from BASF marketed under the trade name BASOFIL®.

A preferred embodiment has threads with a core made of bunched or stranded fibers.  
10 If such threads have high tensile strength - particularly if non-metallic materials are used - high transverse elasticity of the press pad according to the present invention may nonetheless be achieved in this way. In an alternative embodiment, threads have a core made of a monofilament. Thus - particularly using a metal wire - the dimensional stability of the press pad according to the present invention may be ensured in an especially advantageous way.

15 A press pad according to the present invention, woven with warp and weft, whose weft alternately has one thread of each of the different types of thread, is especially preferred. Alternatively, two threads of one type may be followed by one thread of a second type or nearly any other arbitrary numerical combination may also be implemented.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 To explain the present invention, an exemplary embodiment is illustrated in a drawing. The figure shows a detail of a section transverse to the weft direction through the fabric of a press pad occurring to the present invention, the warp threads not being shown.

The fabric of the press pad according to the present invention has a brass strand made of 7 single wires, each with a diameter of 0.2 mm, as the warp. The press pad and its fabric  
25 per se are not shown, like the warp. In the weft 1, the fabric alternately has a first thread 2 and a second thread 3.

The first thread 2 has a first core 4, which is bunched from eight (8) symbolically indicated copper wires, each having a diameter of 0.2 mm. The first core 4 is enclosed by a first sheath 5, having a diameter of 1.5 mm, made of a blend elastomer of 15% fluorosilicone and 85% pure silicone rubber. The second thread 3 has a 1 mm thick second core 6 made of Kevlar filament yarn having 0.168 g/m = 1680 dtex and a 1.5 mm thick second sheath 7 made of a different blend elastomer having 10% fluorosilicone and 90% pure silicone rubber. The first sheath 5 has a Shore hardness of 70 - 75 and an overall density of 2.15 g/cm<sup>3</sup>, and is therefore harder than the second sheath 7, having a Shore hardness of 70 - 75 and an overall density of 1.38 g/cm<sup>3</sup>.

10 This press pad according to the present invention displays a hydraulic padding effect over its surface, which reacts to different pressures and accordingly equalizes them. Upon use in a hydraulic press facility, even with certain degree of heated plate warping, a very good padding effect is achieved, particularly a very homogeneous pressure distribution over the press pad area. A 8 mm thick HDF slab, which is coated with a wear resistant melamine resin overlay and a melamine resin decorative film, displays a perfectly transparent and closed surface after removal from the press. Under the same conditions, a faulty surface, having strong graying, which is not uniformly closed, would be achieved using a press pad known according to the species.